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Hemodynamic Influences on Abdominal Aortic Aneurysm Wall Composition

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Objective: Current Abdominal Aortic Aneurysm (AAA) research focuses on either wall composition or hemodynamics. Human data on combining both topics is lacking. Endovascular (EVAR) treatment separates the aneurysm from the modulating hemodynamic forces and thus allows studying their effects on aneurysm wall composition. Therefore, we compared aneurysm wall composition of EVAR treated patients after redo open surgery and of primarily open repaired AAA.

Methods: Patients undergoing elective open AAA repair, either primary (n=60) or endovascular (EVAR)-redo due to type 2 endoleaks (n=6), were included and matched for diameter. Pre-operatively, patients filled in an extensive questionnaire and during surgery a specimen of the ventral AAA-wall was collected and freshly frozen to study cytokine levels. Part of the wall was used for histology to assess elastin, collagen and inflammatory infiltrate.

Results: Baseline characteristics showed no differences in gender, age, other risk factors of AAA development and medical history. Aneurysm wall of the EVAR-redo patients contained more smooth muscle cells (p=0.013), more collagen in the intima and media (p=0.010), both consistent with a more robust type of AAA-wall being less prone to rupture. No differences in elastin content were found. Histological analysis of inflammatory infiltrates revealed that EVAR-redo AAA contained more lymphocytes in the intima and media (p=0.001) and more macrophages in the media (p=0.004) compared to primary open repair AAA. However, these inflammatory cells are by far outnumbered by the number of inflammatory cells in the adventitia, which did not differ between groups suggesting that absolute numbers do not differ significantly. This is supported by the lack of difference in levels of iL1beta, iL2, iL4, iL5, iL6, iL8, iL10, iL12p70, TNFalpha, TNFbeta and IFNgamma.

Conclusions: Our results indicate that the isolation of the aneurysm from the molding hemodynamic forces by EVAR treatment stabilizes AAA walls. These findings raise the question of shifting the 5mm diameter increase in 6 months cut-off point as sole indication for conversion of EVAR-treated AAA with type 2 endoleaks and await evolution. Further research is needed to confirm these findings.

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PP54.

Minimal Invasive AAA Repair with a Stapled Anastomosis: A Comparison of Techniques

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Laparoscopic aortic surgery is only performed in few centers worldwide. The major reason is still the time and expertise required to perform a laparoscopic aortic anastomosis either hand sawn or with a robot. Yet most of these problems can be solved with an aortic stapler.

Objective: To evaluate the performance and safety profile of an aortic stapling device (OAS) in accomplishing a suture less proximal anastomosis in laparoscopic aortic aneurysm repair. The results were compared with three groups of patients who were operated using either a conventional open approach, a mini incision or a total laparoscopic procedure.

Material and Methods: A prospective non randomized study comparing four groups of AAA patients from two vascular units was performed. Patients in the stapler group were followed up for safety evaluation for 12 (twelve) months. Non-parametric tests were used.

Technical Details: The head of the stapler contains a round cassette that is pre-loaded with 10 clips. A transperitoneal laparoscopic aortic approach was used to obtain exposure of the aorta and the renal arteries. A 7 - 8 cm incision was necessary to clamp the aorta, insert the stapler and to perform the distal anastomosis.

Results: A total number of 96 patients were included into the study. Four groups each containing 26 patients were analyzed. An average number of 2 sutures were required in the stapler group. The proximal anastomosis could be performed significantly faster in the stapler group compared to any other treatment technique. This was associated with a decreased total clamping time. Postoperative CT scans showed a regularly stapled anastomosis without any leakage during a follow up period of one year.

Conclusion: For the first time we report the use of an aortic stapler to perform the proximal anastomosis in aortic aneurysm repair. Time to perform the anastomosis and total clamping time were significantly shorter compared to any other laparoscopic or conventional technique. An aortic stapler can greatly facilitate a minimal invasive approach to AAA resection making the procedure easier and more expeditious.

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Modifiable Predictors of Perioperative Morbidity and Mortality in Open Abdominal Aortic Aneurysm Repair

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Background: The major advantage of endovascular abdominal aortic aneurysm (AAA) repair over open repair is improved perioperative morbidity/mortality. Long term results of the two modalities are comparable. We sought to quantify factors predicting perioperative morbidity/mortality in patients undergoing open AAA repair.

Methods: Consecutive non-ruptured AAA repairs were analyzed for patient demographic factors, perioperative variables including blood pressure, temperature, and glucose control, complications including wound, bleeding, pulmonary, renal, GI, cerebrovascular and cardiac, and 30-day mortality. Uni- and multivariate analysis was performed to determine predictors of morbidity/mortality.

Results: From 1998-2007 317 AAA repairs were performed. 46% required suprarenal clamping. At least one complication occurred in 45% of cases and 30-day mortality was 5.0%. By stepwise logistic regression analysis, independent predictors of morbidity (any complication) were history of heart disease (OR 1.8, 95%CI 1.1-3.0, p=0.028), suprarenal clamp (OR 2.1, 95%CI 1.3-3.7, p=0.004), and operative time (376±93min. with complication, 329±80min. without, OR 1.006, 95%CI 1.002-1.009, p=0.001). Of potentially modifiable risk factors, low postoperative temperature (35.7±0.8 with complication, 36.0±0.9 without) was significant (OR1.5, 95%CI 1.1-2.0, p=.009). Independent predictors of 30-day mortality were patient age (74±7 with death, 66±16 without, OR 1.11, 95%CI 1.03-1.2, p=0.008) and mean intraoperative systolic blood pressure (113±12 with death, 118±10 without, OR 1.06, 95%CI 1.01-1.12). Glucose control did not predict morbidity or mortality.

Conclusions: Control of postoperative temperature and intraoperative systolic blood pressure are modifiable factors that may potentially reduce morbidity and mortality respectively in patients undergoing open AAA repair.

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PP56.

Outcomes of Upper and Lower Extremity Arterial Trauma: Review of Over 8,000 Patients from the National Trauma Data Bank

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Objectives: The purpose of this study is to examine the outcomes in acute arterial traumatic injuries in upper extremities (UE) compared to lower extremities (LE) and blunt compared to penetrating trauma.

Methods: A retrospective review of prospectively collected data from the 2008 version of the National Trauma Data Bank was performed. Using the International Classification of Diseases, Ninth Revision (ICD-9) codes, cases with a diagnosis of arterial vascular injury were identified and procedures were classified according to ICD-9 Clinical Modification codes for vascular therapy. Patients 18 years and older with traumatic blunt or penetrating arterial injury to the extremities were included in the analysis, divided into UE and LE injury groups and then by mechanism of injury, blunt or penetrating. A comparison of demographic information, outcomes, and major amputation rates between groups was performed using Chi-Square, T and Wilcoxon tests.

Results: From 2002-2006, we identified 8,311 extremity arterial injuries among the 1,309,311 patients in the dataset. The patients were 82.7 % male, mean age of 36.2 years, mean Glasgow Coma Scale (GCS) 13.9±3.2 (14.2±2.8 in UE vs. 13.5±3.7 in LE, p<0.0001; 13.7±3.4 in blunt vs. 14±3 in penetrating, p<0.0001) and mean Injury Severity Score (ISS) 10.7±9.8 (8.6±8.3 in UE vs. 14.3±11.1 in LE, p<0.0001; 13.0±11.2 in blunt vs. 9±8 in penetrating, p<0.0001). There were significantly more African Americans in LE group (p<0.0001). See Table.